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- Company (Author) name
- Report date
- Project Name
- Company's job number
- Site address

- Executive Summary / Introduction of the report
- Table of contents
- Project Location Map / Vicinity Map
- Site / Exploration Plans, Boring Location Plans
- Cross-sections / Subsurface profiles
- Exploration Logs
- Monitoring Well Logs
- Cone Penetrometer Logs
- Groundwater Elevation Tables / Data

Includes data from Previous Reports

No new data / data review

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Explanation _____

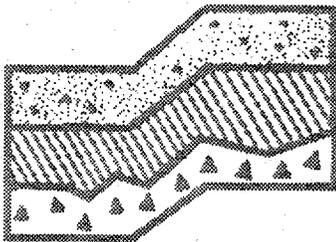
Comments: _____

4083

PRELIMINARY GEOTECHNICAL REPORT

**Pillings Property
73rd Avenue SE and 156th Street SE
Snohomish County, Washington**

Project No. T-3776-1



Terra Associates, Inc.

**Prepared for:
Redstone Development
Kent, Washington**

RECEIVED

JUN 16 1999

**PLANNING & DEVELOPMENT
SERVICES - LAND USE DIV.**

March 12, 1999

98 116556

TERRA ASSOCIATES, Inc.

Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

March 12, 1999
Project No. T-3776-1

Mr. Ron Tremaine
Redstone Development
14200 SE 272nd Street, Suite E203
Kent, Washington 98052

Subject: Preliminary Geotechnical Report
Pillings Property
73rd Avenue SE and 156th Street SE
Snohomish County, Washington

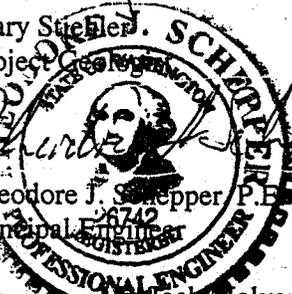
Dear Mr. Tremaine:

As requested, we have conducted a geotechnical engineering study for the subject project. The attached report presents our findings and recommendations for the geotechnical aspects of project design and construction.

Our field exploration indicates the site is generally underlain by glacially-derived silty sand with gravel (glacial till). In our opinion, these soil conditions will not preclude development of the residential subdivision as proposed. Inorganic native soil for structural fills comprised of native soils will provide suitable support for project roadways and residential foundations, provided recommendations outlined in this report are followed.

We trust the information presented is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

Mary Stiefel
Mary Stiefel
Project Geologist

Theodore J. Schaeffer, P.E.
Principal Engineer

cc: Mr. Jack Molver, David Evans and Associates

EXPIRES 6/18/99

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**Preliminary Geotechnical Report
Pilling Property
73rd Avenue SE and 156th Street SE
Snohomish County, Washington**

1.0 PROJECT DESCRIPTION

The project will consist of the development of an approximately 65-acre parcel located north of 73rd Avenue SE and west of 152nd Street SE in Snohomish County, Washington. The project location is shown on the Vicinity Map, Figure 1.

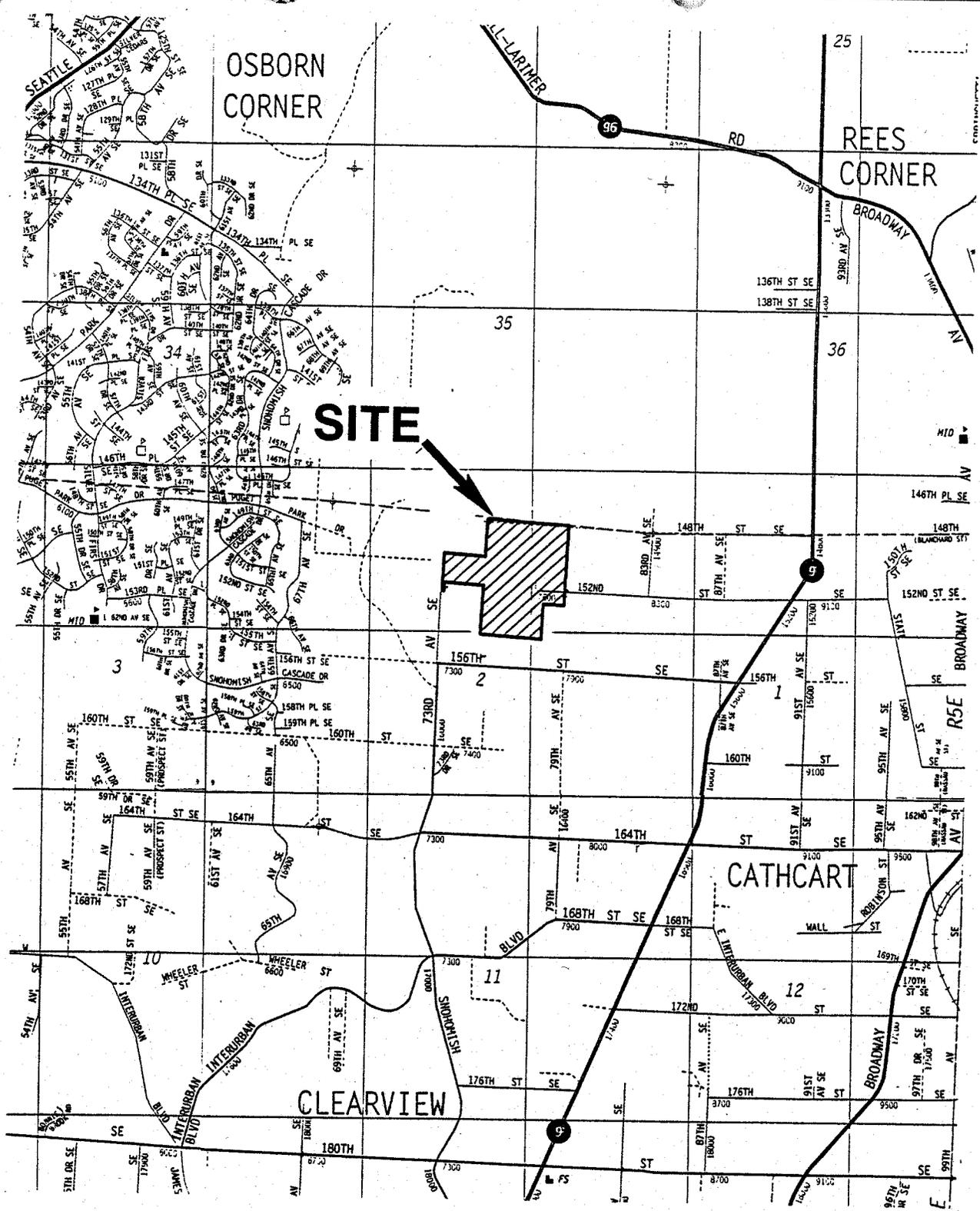
We understand that the proposed development will consist of the construction of a residential subdivision consisting of 150 lots. Based on a review of the Development Concept Plan prepared by David Evans and Associates, dated August 1998, the maximum fills on the site will be 30 feet at the north property boundary, with cuts on the order of 5 to 12 feet across the site. Another plan by David Evans and Associates, dated February 18, 1999, shows the excavation of two detention and wet ponds at the north property boundary, one east of the drainage (209,000 cubic feet), and one west of the drainage (93,000 cubic feet). Several new access roads and cul-de-sacs will be constructed with easements for sewer and water.

We expect the buildings will be single-family residences of one to two stories, with wood-frame construction imposing relatively light foundation loads. We expect structural loads will be about 20 kips for isolated columns and 1 to 2 kips per foot for continuous bearing walls. Main floors will be constructed at grade or framed over a crawl space.

The recommendations in the following sections of this report are based on limited development information and should be considered preliminary in nature. We should review design drawings and construction specifications as they become available to verify that our recommendations have been properly interpreted and amend or supplement them as required by development design.

2.0 SCOPE OF WORK

On February 11, 12, and 15, 1999, we excavated 24 test pits to depths of approximately 8 to 14 feet below the existing surface grades. Using the information obtained from our subsurface exploration, we performed analyses to develop geotechnical recommendations for project design and construction.



REFERENCE: THE THOMAS GUIDE, SNOHOMISH COUNTY, WASHINGTON, PAGES 436, 437, 456 AND 457, 1999 EDITION.



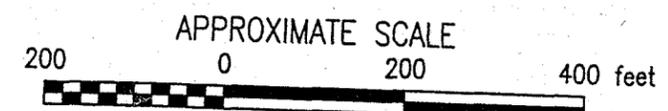
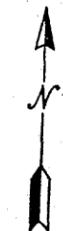
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VICINITY MAP
PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON

Proj.No. 3776-1

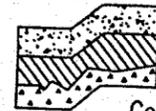
Date MAR. 1999

Figure 1



LEGEND:
 APPROXIMATE TEST PIT LOCATION

REFERENCE:
 TOPOGRAPHIC SURVEY PREPARED AND PROVIDED
 BY CENTRE POINT SURVEYING, JOB No. 1327,
 SHEET 1 OF 1, DATED 12/21/98.



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EXPLORATION LOCATION PLAN
 PILLINGS PROPERTY
 SNOHOMISH COUNTY, WASHINGTON

Proj.No. 3776-1	Date MAR. 1999	Figure 2
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Test Pit No. TP-1

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, damp, loose. (Very weathered till) (SM)	25.9
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	15.9
10	Becomes somewhat cemented and dense (till) at 8 feet.	
		16.7
15	Test pit terminated at 11.25 feet. No groundwater encountered.	

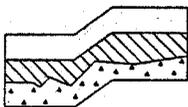
Test Pit No. TP-2

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	30.5
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	18.0
10	Medium dense at 11.5 feet.	
		15.3
15	Test pit terminated at 11.75 feet. No groundwater encountered.	



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**TEST PIT LOGS
PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3776-1	Date MAR 1999	Figure A-2
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Test Pit No. TP-3

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	27.4	▼
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)		
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	15.6	
10	<p>Becomes somewhat cemented and dense (till) at 9 feet.</p>		
15	<p>Test pit terminated at 11.25 feet. No groundwater encountered.</p>	12.1	

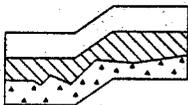
Test Pit No. TP-4

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND, damp. (SM)	33.1	▼
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)		
5	Greenish-gray fine to medium SAND with gravel and trace silt, medium dense, moist to wet. (SP-SM)	16.7	
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (SM)	15.6	
	Becomes dense at 7 feet.		
10	Silty SAND interbedded with sandy silt layers at 9 feet.		
15	<p>Test pit terminated at 10.25. Groundwater encountered at 2 feet.</p>	20.7	



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**TEST PIT LOGS
PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3776-1 Date MAR 1999 Figure A-3

Test Pit No. TP-5

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)		
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	32.5	▼
	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	12.9	
5	Dark gray silty fine to medium SAND with some gravel, medium dense, damp to moist. (SM)	7.8	
	Gray silty SAND with some gravel and cobbles, dense, damp. (Till) (SM)		
		14.3	
10	Test pit terminated at 11.25 feet. Groundwater encountered at 5 feet.		
15			

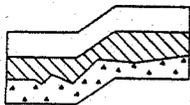
Test Pit No. TP-6

Logged by: MS

Approximate Elev.

Date: 2/11/99

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)		
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	31.6	▼
	Gray silty SAND with some gravel and trace cobbles, medium dense, damp to moist. (Weathered till) (SM)	12.9	
5	Becomes dense and somewhat cemented. (Till)	9.5	
10	Test pit terminated at 8.25 feet. Groundwater encountered at 3 feet.		
15			



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**TEST PIT LOGS
PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3776-1 Date MAR 1999 Figure A-4

Test Pit No. TP-7

Logged by: MS

Approximate Elev.

Date: 2/11/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	20.8
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	14.4
	Dark gray silty fine to medium SAND with trace gravel and cobbles, medium dense to dense, moist. (SM)	16.3
10	Test pit terminated at 10 feet. No groundwater encountered.	
15		

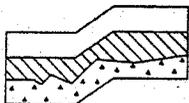
Test Pit No. TP-8

Logged by: MS

Approximate Elev.

Date: 2/11/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Fill - reddish-brown silty SAND with some gravel, loose to medium dense, damp. (SM)	
	Topsoil - dark reddish-brown silty SAND with some gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel and trace cobbles, loose, damp. (Very weathered till) (SM)	26.0
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	17.5
	Dark gray silty fine to medium SAND with trace gravel and cobbles, medium dense, damp. (SM)	
10		14.1
15	Test pit terminated at 14 feet. No groundwater encountered.	



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**TEST PIT LOGS
PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3776-1 Date MAR 1999 Figure A-5

Test Pit No. TP-9

Logged by: MS

Date: 2/11/99

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)		
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	28.3	
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	13.8	
	Becomes dense and somewhat cemented at 8 feet. (Till)		
10		12.2	
	Test pit terminated at 11 feet. No groundwater encountered.		
15			

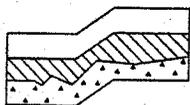
Test Pit No. TP-10

Logged by: MS

Date: 2/11/99

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)		
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)		
	Gray fine sandy SILT, non-plastic, very stiff, damp to moist. (ML)	25.3	
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	35.6	
	Becomes somewhat cemented and dense at 6.5 feet. (Till)	9.3	
	Test pit terminated at 7.75 feet. No groundwater encountered.		
10			
15			



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PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3776-1	Date MAR 1999	Figure A-6
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Test Pit No. [REDACTED]

Logged by: MS

Date: 2/11/99

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM) Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	25.3
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	15.3
	Dark gray fine to medium SAND with gravel, trace silt, medium dense, damp. (SP-SM)	18.9
10	Gray silty SAND with some gravel and trace cobbles, some cementation, dense, damp. (Till) (SM)	11.9
15	Test pit terminated at 10 feet. No groundwater encountered.	

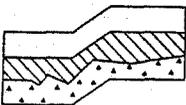
Test Pit No. [REDACTED]

Logged by: MS

Date: 2/12/99

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM) Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	32.3
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	16.9
	Becomes somewhat cemented and dense (till) at 8 feet.	
10		10.3
15	Test pit terminated at 10.25 feet. No groundwater encountered.	



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**TEST PIT LOGS
PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3776-1 | Date MAR 1999 | Figure A-7

Test Pit No. TP-13

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	32.6	▼
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp to moist. (Very weathered till) (SM)		
	Gray fine to medium SAND with gravel, trace silt, loose to medium dense, moist. (SP-SM)	16.7	
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	13.8	
	Becomes somewhat cemented and dense at 8 feet. (Till)		
10		11.4	
10.25	Test pit terminated at 10.25 feet. Groundwater encountered at 2 feet.		
15			

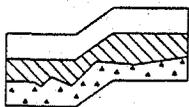
Test Pit No. TP-14

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	27.6	
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)		
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	13.7	
		12.4	
10	Test pit terminated at 8.75 feet. No groundwater encountered.		
15			



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TEST PIT LOGS
PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON

Proj. No. T-3776-1 | Date MAR 1999 | Figure A-8

Test Pit No. ~~TP-15~~

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	31.1
	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	23.0
5	Becomes somewhat cemented and dense (till) at 7 feet.	
		9.4
10	Test pit terminated at 9.25 feet. No groundwater encountered.	
15		

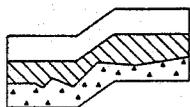
Test Pit No. TP ~~15~~

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	25.6
	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	14.2
5	Becomes somewhat cemented and dense (till) at 8 feet.	
		10.8
10	Test pit terminated at 10.25 feet. Groundwater encountered at 7 feet.	
15		



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SNOHOMISH COUNTY, WASHINGTON

Proj. No. T-3776-1 Date MAR 1999 Figure A-9

Test Pit No. TP-17

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	33.6
5	Gray silty SAND with some gravel and trace cobbles, medium dense, moist. (Weathered till) (SM)	13.3
10	Dark gray silty SAND with some gravel, somewhat cemented, dense (till), damp. (SM)	10.8
Test pit terminated at 11.75 feet. Groundwater encountered at 4 feet.		
15		

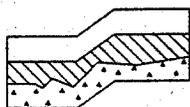
Test Pit No. TP-18

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	37.8
	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	14.2
5	Becomes somewhat cemented and dense (till) at 6 feet.	
		11.1
Test pit terminated at 8 feet. No groundwater encountered.		
10		
15		



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TEST PIT LOGS
PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON

Proj. No. T-3776-1 | Date MAR 1999 | Figure A-10

Test Pit No. T-19

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)		
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)		
	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	14.3	
5			▼
10			
	Medium dense at 12 feet.	23.5	
	Test pit terminated at 12.25 feet. Groundwater encountered at 8 feet.		
15			

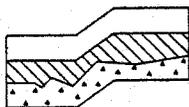
Test Pit No. T-20

Logged by: MS

Approximate Elev.

Date: 2/12/99

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)		
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	29.8	
	Gray silty SAND with gravel, medium dense, damp. (SM) (Weathered till)	13.3	
5	Becomes damp to moist with trace cobbles at 4 feet.	15.8	
	Becomes somewhat cemented and dense (till) at 6.5 feet.	9.0	
10	Test pit terminated at 8 feet. No groundwater encountered.		
15			



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**TEST PIT LOGS
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Proj. No. T-3776-1 | Date MAR 1999 | Figure A-11

Test Pit No. ~~TP-21~~

Logged by: MS

Approximate Elev.

Date: 2/15/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM) Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	25.8
5	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	18.7
10	Becomes somewhat cemented and dense (till) at 11 feet.	12.2
15	Test pit terminated at 12.5 feet. No groundwater encountered.	

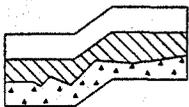
Test Pit No. ~~TP-22~~

Logged by: MS

Approximate Elev.

Date: 2/15/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM) Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	29.4
5	Dark gray fine to medium SAND with some gravel, cobbles, and trace silt, medium dense, moist to wet. (SP-SM)	14.6
10	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	19.8
10	Dark gray fine to medium SAND with some gravel and cobbles, trace silt, medium dense, damp. (SP-SM)	20.3
15	Test pit terminated at 11.5 feet. Heavy groundwater encountered at 3 feet.	



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**TEST PIT LOGS
PILLINGS PROPERTY
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3776-1 | Date MAR 1999 | Figure A-12

Test Pit No. TP [REDACTED]

Logged by: MS

Approximate Elev.

Date: 2/15/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - Dark reddish-brown silty SAND with gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel and trace cobbles, scattered roots, loose, damp. (Very weathered till) (SM)	28.8
	Gray silty SAND with some gravel and trace cobbles, medium dense, damp. (Weathered till) (SM)	15.5
5	Becomes somewhat cemented and dense (till) at 7 feet.	12.0
10	Test pit terminated at 9 feet. No groundwater encountered.	
15		

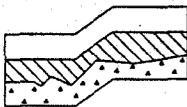
Test Pit No. TP [REDACTED]

Logged by: MS

Approximate Elev.

Date: 2/15/99

Depth (ft.)	Soil Description	Moisture Content (%)
0	Topsoil - dark reddish-brown silty SAND with gravel and organics, damp. (SM)	
	Reddish-brown silty SAND with some gravel, scattered roots, loose, damp. (Very weathered till) (SM)	33.9
	Gray silty SAND with gravel and trace cobbles, loose to medium dense, damp. (SM) (Weathered till)	19.4
5	Becomes moist at 4 feet.	
	Becomes somewhat cemented and dense (till) at 8 feet.	
10	Test pit terminated at 10.75 feet. Groundwater encountered at 4 feet.	
15		



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Proj. No. T-3776-1 | Date MAR 1999 | Figure A-13